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How do crises spread? The polycrisis and crisis transmission

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Research Article

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Abstract

Non-technical summary. The term polycrisis refers to simultaneous and interconnected crises that amplify each other's effects. Understanding how crises spread is crucial for understanding how a polycrisis operates. This article explores the conditions under which crises transmit across systems. By examining various theories – from complexity thinking to epidemiology – it discusses to importance of several conducive conditions and system resilience in shaping crisis transmission. The polycrisis concept underscores the need for interdisciplinary approaches to address interconnected global challenges. By identifying how crises spread, policymakers and researchers can better anticipate and mitigate their impacts, fostering resilience in the face of growing systemic risks.

Technical summary. The concept of the polycrisis builds on the assumption that crises are interconnected. This suggests important processes of crisis transmission operate. However, beyond initial modelling we do not know much about how crisis transmission works. For this reason, this article makes a conceptual contribution by presenting a variety of conditions for crisis transmission. It applies an eclectic and inter-disciplinary approach, presenting a diversity of conceptual arguments addressing when and how crises can spread. These include but are not limited to: conceptualizing crisis boundaries and large impact events, neofunctionalism, rational choice theory, assemblage theory, complexity thinking, and epidemiological and evolutionary approaches. Lastly, crisis transmission also depends on the ability to cope with crises and thus resilience plays an important role.

Social media summary. Crisis transmission informs how a polycrisis operates. Discontinuing transmission helps building resilience.

1. Introduction

Polycrisis research is dynamically evolving. It is primarily driven by a growing awareness, scientific evidence, and individual experiences of overlapping crises which are spanning policy boundaries and are constituting a globally important phenomenon. With intellectual roots in complexity thinking, research on the Anthropocene and earth system science, it is a burgeoning academic field (Homer-Dixon et al., 2015, 2022; Lewis & Maslin, 2015; Richardson et al., 2023). Furthermore, it is spreading beyond its original disciplinary boundaries and making inroads into other fields such as the social sciences (Albert, 2024; Brosig, 2025; Dinan et al., 2024; Helleiner, 2024; Hening & Knight, 2023; Zeitlin et al., 2019).

Central for the future progress of this evolving research is its ability to conceptually substantiate its central claims. While different definitions of the term polycrisis can be found in the literature, the notion of the polycrisis rests on the observation that multiple crises are occurring simultaneously, are interlinked and condition each other (Brosig, 2025; Morin & Kern, 1999, p. 74; Swilling, 2013, p. 98). The introductory article to this special issue defines a polycrisis as 'causal entanglement of crises in multiple global systems in ways that significantly degrade humanity's prospects' (Lawrence et al., 2024, p. 2). Such a definition places the phenomenon of the polycrisis at the global system level, a high qualifying condition. However, non-globalized but still interconnected crises may exist at lower level.

Central for the concept of the polycrisis is the assumption that crises are trans-boundary. In other words, they are not emerging and having effects in isolation from each other but are interlinked and therewith are contextual phenomena. While it would be too much to assume that any crisis is generally a function of a polycrisis, the term polycrisis bears particular relevance if it is regarded as a phenomenon *sui generis*, which means it has at least system character. In the end, a polycrisis emerges when crises are interconnected. This implies they can produce spillover effects. Interlinked crises have the potential or are creating the conditions for their reproduction and can condition each other (Janzwood & Homer-Dixon, 2022). In this sense, a polycrisis is more than the addition of multiple crises. It rests on the idea that crises do not occur in isolation from each other.

Realistically, a polycrisis consists of crises which emerge as a combined consequence of crisis-specific individual, and possibly disconnected, causes and causes which are linked to

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other crises. The systemic character of the polycrisis comes into play when crisis interconnection is strong. In a polycrisis setting crises are assumed to mainly result from system effects of other crises. A crisis which only has individual causes and its effects are area-specific does not qualify as contributing to a polycrisis; it would rather be an important disruptive but isolated event. For a polycrisis to exist the implicit assumption is that crisis transmission is strong, stable, and frequent. Despite the growing popularity of the term, the conditions of when and how crises are spreading remain under-explored.

For this reason, this contribution focuses on the nature and conditions of crisis transmission. It offers baseline guidance on how to conceptualize this essential element. In this regard, it is a hypothesis-proposing study but does not offer empirical testing which is left for future research. It does also not aim to present a single parsimonious theory of crisis transmission. Instead, it takes an eclectic approach using a variety of theories which correspond to the diverse empirical phenomenon (Rudra & Katzenstein, 2010, pp. 10–23). This inter-disciplinary orientation and analytical eclecticism is warranted because the research object 'polycrisis' requires an inter-disciplinary analysis. Thus, 'multiplicity' and 'heterogeneity' are better suited analytical tools than striving for paradigmatic purity (ibid., p. 20). Because crises do vary significantly, and there is no fixed list of crises which make up the polycrisis, an open approach for exploring crisis transmission is important.

Henceforth, the article uses rational choice arguments and neofunctionalist conceptions to help account for spillover effects. It builds on complexity thinking and assemblage theory in addition to evolution theory and epidemiology to further explore the spread of crises. The mentioned theories are eclectically chosen following their ability to explain crisis transmission and taking into account the complex nature of the polycrisis. In this context, those theories which bear the potential to explain crisis transmission mostly at mid-range theoretical level and within a complex environment are the preferred choice. The different conceptualizations of crisis transmission presented below are an early attempt at theorizing crisis transmission in the hopes of opening a discussion on what makes crises spread and encouraging further research. It does not constitute a comprehensive list of all possible or existing theories but refers to a prominent selection displaying a good conceptual fit. Future empirical testing needs to demonstrate which of the presented conditions are most relevant, need adjustment, or can be abandoned.

The article is structured as follows: section 2 constitutes the main section which collects different causal explanations for when and how crises can be expected to spread. Each subsection presents a different stream of reasoning, formulating a set of conjectures. Analytical eclecticism does not engage in theoretical synthesis of the used theories and approaches. Rather the emphasis is on presenting a wide range of diverse causal logics mostly operating at the mid-range level. The base assumption guiding this contribution is that crises do not spread automatically but various conditions facilitate the process of transmission. Crisis transmission is likely not a unitary process but conditioned by various parameters which can best be conceptualized using a diverse set of theories. Given the absence of empirical testing in this study, the focus is placed on internal validity of the argument not on its external validation.

The analysis starts by introducing a baseline argument building on the assumption that crises originate within certain boundaries. Furthermore, this subsection discusses potential effects of stressor similarity and variety. The following subsection explores crisis transmission as a consequence of large-scale impact events. Based on neo-functionalism, the next one analyses how spillover effects can foster crisis transmission. Assemblage theory and epidemiological approaches complement the picture by offering more systems-oriented explanations for transmission. The last section before the concluding one explores crisis transmission from a counter-intuitive position, asking what works against it. It offers arguments for resilience against crises which also impacts the chances of transmission. The article ends by carving out a research agenda for crisis transmission.

2.1 The unbound-boundary character of crisis transmission

Logically a polycrisis builds on the idea of continuing crisis escalation. A polycrisis does not emerge out of thin air or unexpectedly but goes through a building up phase. In order to reach the polycrisis status, crises need to be interconnected. Implicitly it is assumed that crises can transmit beyond their area of origin. If crises can expand beyond their 'home turf' this implies that they are a phenomenon effectual within a certain range of boundaries. It also implies that they are effectual within their area of emergence and are likely of different consequences beyond. It indicates a degree of spatiality that crises occupy. A crisis is not limitless (radically unbound) and few might be global and capture entire systems from the beginning. Exploring the issue of crisis transmission, it is *a priori* unclear what effects a crisis brings about outside its area of origin. We can generally assume that a degree of *boundary dependence* exists and rather operates against crisis transmission or at least places certain limits on it. Within-system expansion does not constitute a case of crisis transmission, it might, however, be a qualifying condition for its wider spreading.

Boundary crossing, if not being a random event, realistically requires some form of momentum or amenable environment pushing a crisis beyond its original area of operation. While the initial area of emergence provides boundaries, in a polycrisis setting a crisis is supposed to have trans-boundary effects. Either the conditions (stressors) which structurally facilitate a crisis appear across various systems (stressor sharing) or the crisis itself affects stressors and/or trigger events feeding into other crises (Lawrence et al., 2024, p. 8; Rocha et al., 2018). Such a conceptualization of crisis transmission is based on two causal pathways. They can be characterized as either in-put or out-put oriented.

In this context, it is logical to assume that an existing crisis which emerges as a consequence of a set of favorable boundary conditions develops because those conditions persist or can be found elsewhere. When a crisis emerges in parts of a system, similar conditions are likely to be found in neighboring parts of that system, facilitating within-system expansion, a moderate form of crisis transmission. Spreading to other systems would require similar stressor conditions at work. In the end, a crisis's transmission occurs because amenable conditions exist outside its area of origin. But it is not automatically convincing why similar stressors should have similar effects on different systems. While a financial crisis can spread to the real economy quickly and produce social and political upheavals, there is no ultimate certainty that political systems will fail the same way. The stability of political systems does not exclusively rely on financial and economic prosperity, despite these being important stressors for a crisis. Furthermore, the same stressors applied to different systems can theoretically also contribute to crisis confinement or

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their rapid expansion depending on how well they correspond with the crisis at hand.

Akin to the logic of evolutionary adaptation which builds on processes of adjustment to an external environment for a species to thrive, crises may transmit to places in which external conditions offer the best opportunities to develop. Thus, they can be assumed to develop best in an ecological niche. The speed and extension of crisis transmission may than depend on the relative strength of external conditions favorable to a crisis. On the flip side, crises are locked-in to their area of origin and hardly transmit when outsideareas do not offer amenable conditions. In this boundary dependency scenario, crises and their proliferation are primarily a function of external conditions.

For conceptualizing crisis transmission, it appears logical to assume that amenable conditions are those which look similar to those in the area of origin as they already evidenced their effects. Thereby *stressor similarity* is likely to replicate existing crises. Following the logic of boundary conditionality, the greater stressor similarity the more likely the same crisis is spreading. For example, a financial crisis is more likely to spread to countries under debt stress and sectors depending on finance such as, for example, the agro-business, which has consequences for food supply. Such a situation depicts rather linear within-sector/system expansion but with the potential to affect sectors beyond the economic sphere, such as the social cohesion of a society.

However, crisis transmission following the logic of the polycrisis requires outside system expansion. Stressor similarity is no guarantee for crisis transmission because why should differently structured systems respond similar to the same stressors? Keeping complexity thinking and non-linearity in mind one can argue that greater *stressor variety* increases the chances of crisis transmission but decreases the likelihood of (exact) crisis replication. Stressor sharing might mostly contribute to within-system expansion but a polycrisis is conceptually linked to a multitude of (different) crises which are unlikely to be all reducible to a static set of stressors. This points toward a diversity of stressors working toward crisis transmission. For example, the agricultural sector when confronting adaptation pressure through climate change can get into an existential crisis if financing adaptation becomes inaccessible and two separate crises (financial and climate change) merge.

2.2 Large-scale impact crises

Assuming that stressors in one area simply or easily translate into crises in other areas is not only based on simple linear projections, but also problematic because it implies radical unboundedness of crisis effects. The problem is that not many single crises would be strong enough to affect stressors across many different systems in the assumed linear causal fashion. Great power rivalry resulting in a nuclear war, an abrupt stop of the Atlantic Meridional Overturning Circulation (Gulf Stream), a large meteorite hitting the planet, eruption of a super volcano or a highly deadly pandemic would certainly be large enough to cause a chain reaction of many follow-on crises with globally devastating consequences. Such events have been explored in the literature of global catastrophic risks (Bostrom & Ćirković, 2008). However, the number of such large-scale crises is limited and their likelihood might not be very high. A fair proportion of contemporary crises operates at a much lower scale missing the deep-impact initial momentum. One can even ask if large-scale impact events leading to a polycrisis reflect the 'true spirit' of the term, as it explicitly does not build on the consequences of a single event but on system elements not reducible to an isolated cause.

Despite this, large impact crisis events offer strong (linear) arguments for crisis transmission. At the center is the observation that a large crisis carries its disruptive momentum through various systems. The model of a large impact single crisis implies a degree of hierarchy. In this sense, it is operating at a vertical level. The closer (degree of entanglement) one is placed to the initial impact, the stronger its effects. From here one can hypothesize, that crisis transmission is more likely to occur the closer it is placed to a large impact event. It matters if it is in direct succession or merely a follow up crisis at the end of a longer chain of consequences. Under such a transmission scenario crises fizzle out eventually with increasing disconnect to the initial impact. With longer timeframes and distance from the original crisis the likelihood of transmission declines if the system cannot create self-sustaining crises of equal scale for a longer period of time.

Different qualitative degrees of a crisis can also be assumed to have different effects on how crises spread. A higher crisis intensity is more likely to spread (high *vs* low impact crisis). While it is logical to assume that crisis transmission is fast and more consequential the closer to the initial event, followed by a gradual decline of transmission with increasing detachment, research has also expressed that some crises do not only have a large impact but are also irreversible. The literature on tipping points, notably in the context of climate change, argues that a number of natural systems such as the Greenland and West Antarctic ice sheets, warm-water coral reefs, North Atlantic Subpolar Gyre circulation, and permafrost regions are close to or are already in the process of experiencing irreversible damage (Lenton et al., 2023). Such crises are not only large impact events but are also nearly permanent. Thus, their impact does not diminish over time but is a constant source of damage with many follow up consequences. This category of crisis is best placed for lasting crisis transmission.

However, the Global Tipping Point Report 2023 finds that 'Tipping 'cascades', where tipping one system causes another tipping point to be passed, and so on, are possible but currently highly uncertain' (Lenton et al., 2023, p. 15). This supports the assumption that crises develop best within the boundaries of their area of origin and expand differently outside. Not all crises are qualitatively the same. While the Global Tipping Point Report sees little to no evidence that irreversible tipping systems inevitably cause other systems to irreversibly collapse, this certainly does not rule out crisis transmission at a lower scale and dimension but of different character with still damaging consequences.

2.3 The role of functional spillover effects

How crises are spreading might technically not be different from the transmission of technological inventions or various types of human social organization (Zeppini et al., 2014). One of the most prominent theories of European integration, neofunctionalism, strongly emphasizes the importance of spillover effects as a catalyst for integration (Schmitter, 1969). The argument is a functional one. Integration in one area is likely to spillover, as the gains from it can only be fully realized when extending integration into other fields (Schmitter & Niemann, 2009, pp. 49–50). This generates a certain pull for expansion. Thus, spillover effects are not random but depend on interdependent functionality. In such a setting the operation of a system is at least partially dependent on another one. Applied to crisis transmission one

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can argue that crises are more likely to spread when there is a high degree of functional dependency between systems. The 2008 financial crisis could not be contained to the banking sector as it was closely linked to the real economy which created further social and political knock-on effects (see Ainsworth & Hoyer, 2025, this special issue). Furthermore, one can argue that system similarity works as a crisis transmitter. The financial crisis spread particularly fast to countries with a liberalized financial and economic sector while it was less pronounced in countries with stricter regulations.

Functional spillover effects are essentially stressors which can tip a system into a crisis but they are not operating with deterministic certainty. It is important to identify scope conditions in which functional dependency becomes most pronounced. In this context, the degree of system fragility becomes relevant. Functional spillover can be assumed to have stronger effects when hitting an already fragile system. In such a situation even lower degrees of functional dependency might be enough to cause a crisis to emerge. The opposite is true for robust systems. In this context higher degrees of functional dependency are needed for crisis transmission.

In sum, the argument of neofunctionlist spillover rests on the importance of system functional interdependency. The argument implies a degree of automaticity and the case of the financial crisis spreading into the economic field might be an obvious one. What empirical studies need to show is, first, how many functional linkages actually exist and, second, if and how they contribute to crisis transmission enabling processes of self-reinforcement. Furthermore, how much crisis-spillover is really driving crisis transmission? In other words, how strong is the causal effect? At what threshold level is it strong enough to individually cause or contribute to other crises?

2.4 Mass crisis self-organization and assemblage theory

Crisis self-organization is an important system dynamic defining a key characteristic of the polycrisis and is well articulated in complexity theory (Chu et al., 2003). Still, it is often unclear how to get to the point of a self-organizing polycrisis. More likely than not, the current instantiation of the polycrisis rather builds on interconnected crises with elements of self-sustenance than being fully self-organizing. A polycrisis not triggered by a single deep impact event needs to rest significantly more on its system qualities at horizontal level. In fact, a polycrisis might equally emerge from multiple crises appearing simultaneously creating disruptive effects on their own, causing other crises to emerge. Meaning many crises are operating with self-organization, but horizontally, with no deep impact and no crisis cascade. In this scenario a polycrisis emerges when many individual crises form a mass crisis system. For example, the many crises which appeared in close succession recently such as the war in Ukraine, climate change or Covid-19 are only loosely connected and are not exclusively resting on system effects. These crises to a large extent emerged individually but built interconnections after their appearance to reinforce each other.

The underlying assumption here is that crises must cross a certain impact threshold beyond which they significantly affect the operation of other crises. The sheer mass of crises even with the absence of far-reaching cascading effects creates a cluster of problems which appear as equally pressing and hard to solve individually. Assemblage theory captures this situation quite well. It explores social system phenomena which are rooted in unit heterogeneity but congregate into a system (Delanda, 2016). Polycrisis research has not clearly defined the crisis complexity threshold at which crisis interconnections are strong enough to speak of a polycrisis. While assemblage theory remains at some distance of becoming an explanatory theory (Nail, 2017), it is a helpful starting point.

A polycrisis assemblage would result from simultaneously appearing crises which emerge individually but through initially limited crisis transmission create a crisis system. The mass appearance of crises creates systemic disruptive consequences which extend beyond their additive effect. The mass crisis event enforces connections between crises which initially did not exist. This creates momentum for crisis transmission as the space in which crises can emerge independently is getting smaller and the likelihood for overlap increases. The war in Ukraine contributed to global food price increases at a time when post-Covid-19 inflation was spreading and the number of people living in food insecurity increasing also because of climate change. In the context of mass crises, a polycrisis develops without the assumption of cascading effects and crisis transmission resulting from crises causing other crises.

In contrast to neo-functionalism, assemblage theory is no mid-range approach. Rather than offering a clear set of testable causal conditions, it is a macro approach. Its strength does not rest in clearly defining individual conditions for crisis transmission but through providing a complexity-oriented macro perspective which deviates from crisis transmission conceptualized in the previous sub-sections. While large-scale impact events and functional dependency understand crisis transmission as vertical action resulting from sequences of events in a chronological manner, assemblage theory places a stronger emphasis on synchronous action at the horizontal level.

2.5 Crisis epidemiology

The term 'crisis contagion' gained popularity during the global financial crisis starting in 2008 (Aloui et al., 2011). Research focused primarily on how a financial crisis in the US could spread to other markets and even beyond the financial sector. Some of the research explicitly refers to epidemiological modelling, directly comparing the spread of the financial crisis with infectious diseases (Bucci et al., 2019). During the Covid-19 pandemic (2020–2022) the issue of contagion was primarily explored in relation to the emergence of different variants. However, the multiple consequences of the pandemic and their potential to cause numerous other crises have been discussed as well (Basedau & Deitch, 2021, p. 9).

An epidemiological approach to crisis transmission builds on the existence of processes of self-reinforcement. A virus is primarily dangerous not just because of contagion but because it is characterized by a process of exponential self-reinforcement creating amplifying effects. The more people are infected, the faster and more extensive the spread of the disease. With increasing infection rates, the likelihood of secondary crises emerging increases too, such as a slowing down of economic activities, loss of state control, and conflict over scarce resources.

The harm primarily results from the exponential growth of infected individuals but also its growth inside the virus carrier. The virus is replicating fast, overpowering the immune-system of its host. Rapid replication of the virus is a function of its inner fabric, its RNA/DNA. It replicates using host cells. In this introspective view, the emphasis is not on external conducive

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conditions facilitating crisis transmission but on the internal constitution of the crisis. It can be expected to facilitate crisis transmission when it initiates processes of self-reinforcement.

Following an evolutionary logic no conscious agency is needed to trigger changes. These rather originate from accidental mutations. Within the context of crisis transmission, a legitimate question is whether crises can adaptively develop processes of self-reinforcement in order to spread. Assuming internal adaptation is possible, the speed and quality of inner crisis change can be a viable indicator for the potential of crisis transmission. The analogy to seasonal flu (viruses) which rapidly change their genome to spread is obvious. Of course, most crises are not identical to viruses. But assuming that their inner constitution remains stagnant might be a too simplistic assumption. Not only can a crisis have various effects depending on external conditions but crises may also change internally. This is at least a theoretically plausible possibility. The frequency and quality of internal change may work as an indicator for the potential of crisis transmission. A morphological perspective can further explore the potential of an evolutionary approach to crisis transmission.

A possible next step in advancing an epidemiological approach could concentrate on systematic mapping and classifying of known processes of self-reinforcement. These are more widespread than commonly assumed (Levermann, 2023). In the context of climate change the melting Greenland ice sheet or deforestation tend to create feedback loops which reinforce change. The capitalist economy tends to create more wealth for those who are already wealthy. Even small growth rates can have compounding effects. For example: a population or deforestation rate of 2% annually doubles first after 35 years, after 20 years a second time and after 15 years again. With long enough timeframes even initially low growth can become overwhelming growth. Phenomena with non-linear (exponential) growth can be potentially harmful because they can become dominant and hard to reverse processes of change.

While it is true that most crises are not taking the form of an infectious virus, some do. The Covid-19 pandemic of course resembles best an epidemiological pattern of crisis transmission. Different degrees of contagion and severity of the infection informed counter-measures (lock-down, etc.) which triggered numerous other crises, economic, social, educational, and psychological. Pandemics are regularly recurring crisis events. One or two pandemics are likely to break out in a human's lifespan. Zoonotic diseases emerge from an interplay between eco-systems, animals, pathogens, and humans (Morens & Fauci, 2020). Climate change and increasing land-use widen the risk of pandemics. Furthermore, the artificial creation of pathogens as biological weapons illustrates how the internal fabric of a risk (not yet a crisis) can be created. Genome editing for creating biological weapons is technologically possible (Paris, 2023). Similarly, cyber warfare as an act of deliberate design can have cascading effects if for example targeting interconnected infrastructure (Palleti et al., 2021).

3. What works against crisis transmission?

In the literature the ability to withstand crises has traditionally been framed under the notion of resilience understood a system's capacity to absorb crisis shocks. This is visible in a system continuously performing its inherent functions despite significant disturbances (Holling, 1973, p. 14). Furthermore, resilience is understood as an adaptive process, in which a system rearranges itself to continue to perform its functions. The resilience literature has produced a wealth of knowledge which cannot be discussed in detail in this contribution. Instead, a selection of conditions is presented mostly with recourse to rational choice theory, providing examples of how the response to crises can work against their transmission.

If a crisis is a situation harmful and disruptive to human living, it is logical to assume that efforts will be made to stop, contain, or at least respond to it. For countering the Covid-19 pandemic the rapid development of effective vaccines played an important role; for resolving violent conflict the UN at its peak deployed more than 100,000 peacekeepers; and for countering climate change, investment in renewable energy has surpassed investment into fossil fuels. In essence, efforts of crisis management naturally work against crisis transmission. Thus, crisis transmission is also a function of all those attempts to counter a crisis.

Clearly, the awareness of a crisis, knowledge of how it works and planning to manage, contain, or solve it, is a variable affecting the chances of crisis transmission. Tipping points are not only associated to negative events such as crisis cascades but can also work for positive change (Lenton et al., 2022). However, polycrisis research tends to emphasize (and maybe even over-emphasize) feedback loops aggravating existing crises. Crises that do not spread are usually not at the center of interest. Conceptualizing crisis management is naturally complex. At the center of it is human agency acting in numerous ways – sometimes erratically, sometimes strategically – to counter crises.

A rational choice approach might be a good starting assumption, especially in the context of global governance responses to larger crises (Snidal, 2002, pp. 73–93). Generally, it is rational to assume that human behavior is interested in countering crises, as a crisis degrades human living conditions. However, intuitively we know that collective crisis responses are often late, lukewarm, semi-effective, not systematic nor rapid. Increasingly, the international governance system is characterized by great power rivalry, a drift away from formal international organizations, and problematic multilateralism (Börzel & Zürn, 2021; Patrick, 2015; Reykers et al., 2023). Thus, the general rationality of preventing crises is not easily translated into effective action. To some degree, the global polycrisis is linked to a crisis of global governance. In any case, action taken to counter crises necessarily involves political decisions which tend not to simply implement the functionally best solution but considers an array of interests and reflects power relations. This can produce uneven results or even deepen existing crises. Resistance against 'intrusive' internationalism or climate change denial is a strong inhibiting force. In this context, effective international crisis response requires a conducive environment for action. From a rational choice perspective one can formulate a number of conditions.

First, one can assume that crisis response corresponds to the extent of harm a crisis produces (Hoyer et al., 2023). However, there are hardly many crises that are equally harmful to everyone, and what constitutes harm might be perceived differently. It is at least not a universally fixed category. If crisis intensity is a trigger for crisis responses, it is logical to assume that direct and immediate effects create a greater urgency for action than an indirect, delayed, and varied crisis impact. Thus, effective crisis response is more likely to appear the more direct and immediate the effects of a larger crisis. In the case of the 2008 global financial crisis or the Covid-19 pandemic we have seen (some) governments reacting almost instantly to these crises by bailing out faltering banks and stabilizing economies with low interest rates and rescue

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packages, as well as rolling out free vaccination programs. This poses a visible contrast to climate change-related threats. Variability of the threat as well as its long-term character have contributed to the rather sluggish global response.

Furthermore, effective crisis response and therewith lower degrees of crisis transmission following a rational logic of action also correspond to the size of adoption costs. The lower adoption costs for crisis response, the more likely a timely and effective reaction limiting the chances of crisis transmission. Adoption costs are multifaceted. They do not just entail material and financial resources but also involve cultural aspects such as learning processes or social acceptance of anti-crisis measures. Furthermore, chances of quick success of implemented measures can be assumed to increase incentives for their implementation.

At the international level adopting anti-crisis policies also raises the question of monitoring and sanctioning free riding behavior. This is usually the role of effective global governance institutions (international organizations, international treaties, etc.) which address collective action problems and therewith provide global public goods (Shepsle, 2006). Further on, the ability to facilitate a collective response rests on at least a rudimentary agreement requiring a mapping of joint futures. Ready-to-use scientific innovations facilitate effective crisis response. At global level scalable solutions with increasing returns are best placed for rapid adoption (Lenton et al., 2022). Nearly always, responding to a crisis effectively requires innovating and reorganizing existing governance practices which demands not only material and technical capacities but also political momentum for change (Jørgensen et al., 2023, p. 11).

4. Toward a research agenda on crisis transmission

The issue of crisis transmission is central to the notion of the polycrisis which builds on the idea that crises are interconnected. How this interconnection evolves and through which causal conditions it is shaped has not been at the center of polycrisis research so far. Thus, gaining theory-driven knowledge about crisis transmission is important for further advancing the polycrisis theme. Given the heterogeneous nature of a phenomenon consisting of multiple crises in various settings, it is unlikely that a single theory or conceptual approach can offer satisfying results. Therefore, this contribution started exploring crisis transmission from a multi-disciplinary perspective, eclectically using various approaches and theories. After having discussed a number of causal conditions that may help to explain how crises can spread, what are the next steps? What does a future research agenda look like?

Empirically crisis transmission is closely linked to a diversity of crises which cannot be assumed to be explained by a few master variables. Because of this unit (crisis) diversity, mapping exercises are important, laying the ground for theory development and subsequent hypothesis testing. Typological theory building can ideally link a nuanced descriptive characterization of various crises with specific causal conditions for crisis transmission. Cumulative knowledge about when which condition has explanatory traction requires cross-crisis analysis conducted in a multi-scalar and multi-system setting. Such analyses are missing at the moment. Exploring a critical number of crisis dyads may also gradually contribute to better knowledge of which conditions apply.

Lastly, the presented diversity of causal conditions for crisis transmission raises the question of how they relate to each other. While the answer can ultimately only be validated through empirical testing, more likely than not crisis transmission is no unitary phenomenon and different causal logics can be assumed to work in parallel. More likely than not, the character of a crisis has a defining impact on its chances of transmission. Functionally interdependent sectors are most likely to spread crises based on the neofunctionalist conception of spillover effects. Finally, empirical testing needs to pay attention (measurement) to the quality of crisis transmission. The fact that crises can spread, facilitated by a set of causal conditions, does often not as such imply a specific intensity of spillover. Instead, one can assume various degrees of impact, from just contributing to an existing crisis to triggering an entirely new one. From having an immediate or delayed effect, or from impacting several other crises or just one. Again, these questions are best explored through comparative cross-crisis analysis.

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